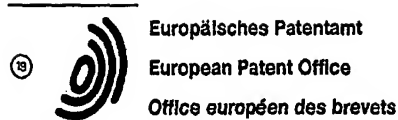


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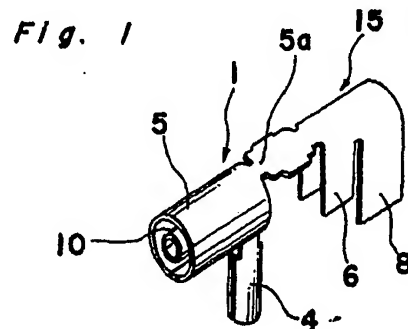
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(54) **Connector.**

(57) Improvements in a connector for mounting a cable which causes the housing conductor to adhere under pressure against, connect with the outer conductor adapter with the first calking ring member, retains the housing insulator of the cable with the second calking ring member so as to strengthen the combination with the cable may be made more positive, higher in reliability in the electrical and mechanical connection between the cable and the connector.



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## CONNECTOR

BACKGROUND OF THE INVENTION

The present invention generally relates to a connector, and more particularly, to improvements in a connector for mounting a cable.

Conventionally, such connectors as shown in, for example, Fig. 28 and Fig. 27 are used as connectors to be mounted on the cable. Referring to the drawings, an inner contact 104 insulated from a connector outer conductor 102 with an insulating bushing 103 is inserted into the connector outer conductor 102 of a cut, treated housing 101. An outer conductor adapter 107 which is connected with a housing conductor 106 of a cable 105 is mounted on the connector outer conductor 102. The connector is extended through the cable 105 prior to the connection between the connector and the cable 105, and has a sleeve 108 which fixedly attaches under pressure the housing conductor 106 against the outer conductor adapter 107 in the connecting step.

In order to mount the cable 105 on the connector, as described in Fig. 27, first, an internal conductor 108 and an internal insulator 109 exposed from the housing insulator 110 of the cable 105 are inserted into the outer conductor adapter 107 of the connector. The internal conductor 108 is inserted into the slit 104a of the inner contact 104 so as to solder the internal conductor 108 and the inner contact 104 for the connecting operation thereof. Thereafter, a cover 111 is put on. The outer conductor adapter 107 is covered with the housing conductor 106, the sleeve 108 is moved onto the housing conductor 106. The housing conductor 106 is caused to adhere under pressure against the outer conductor adapter 107 by the calking operation of the sleeve 108.

But the conventional connector had a problem that the housing, the outer conductor adapter and so on were cut, treated, the manufacturing step was complicated and the sleeve for pressure adherence use had to be manufactured, prepared as the separate parts, thus resulting in higher cost. Also, there was another problem that the sleeve for pressure adherence use had to extend through the cable in advance, the step in the mounting of the connector on the cable became complicated, and the standard operation time became longer.

SUMMARY OF THE INVENTION

Accordingly, the present invention has been developed with a view to substantially eliminating the above discussed drawbacks inherent in the

conventional connector and has for its essential object to provide an improved connector.

Another important object of the present invention is to provide an improved connector of the type referred to above, which is lower at cost, and is capable of shortening the cable assembly time.

Still another object is to provide a connector which is capable of positive connection between the socket and the cable conductor without the soldering operation, and a connector which is capable of corresponding to the smaller size thereof.

A further object is to provide a coaxial connector, wherein the short-circuiting that is caused by the contact between a cable central conductor and a connector outer conductor is prevented, the insulator may be easily engaged with the connector outer conductor, the above described insulating plate becomes hard to be disengaged from in the operation time after the engagement thereof, further the slit of the connector central conductor may be prevented from being expanded even by the pressure insertion of the cable central conductor.

A still further object is to provide the connecting construction between the coaxial connector and the coaxial cable, wherein easier mechanization may be effected, so that the operation time may be shortened, and also, the cost down may be provided, the quality may be stabilized, and furthermore, the electrical connection may be stabilized.

In accomplishing these and other objects, according to one preferred embodiment of the present invention, there is provided a connector which includes a housing that is provided integrally with a connector outer conductor to be connected through an outer conductor adapter with at least a housing conductor of a cable, and a sleeve portion that causes the housing conductor of the above described cable to adhere under pressure on the above described outer conductor adapter, and also combines the cable with the connector, and an inner contact that is provided, insulated from the connector outer conductor, on the inner side of the above described connector outer conductor, and is connected with the internal conductor of the cable.

The above described sleeve portion may be provided with a first calking ring member which causes the housing conductor of the above described cable to fixedly adhere under pressure on the above described outer conductor adapter, and a second calking member which retains the housing insulator of the cable to intensify the combination of the cable.

In the connector of the invention composed of such construction as described hereinabove, the housing provided integrally with the connector out-

er conductor portion and the sleeve portion eliminates the necessity of preparing the sleeve for pressure adherence in the conventional connector as separate parts so as to simplify the manufacturing step of the connector, and also, removes the step which is indispensable in the conventional connector of extending the sleeve for pressure adherence use through the cable in advance so as to simplify the mounting step of the connector onto the cable.

Also, the connector of the present invention is characterized in that at least one cable side slit which is narrower in width than the conductor of a cable to be thrust in there is provided on the side, to be connected with the conductor of the cable, of a cylindrical socket, the above described conductor is thrust in into the slit on the above described cable side to bring the socket and the above described conductor into pressure contact with each other to effect the electric, mechanical connection between both of them.

Further, the connector of the present invention is characterized in that at least one cable side slit which is narrower in width than the conductor of the cable to be thrust in there in approximately parallel to the axial center of the above described socket on the side, to be connected to the conductor of the cable, of a cylindrical socket, and at least one connector side slit is provided so that it may not be provided on an extension line extended in a slitting direction thereof from the above described cable side slit, on the side of connecting with the contact of the other connector.

In the connector composed of such construction as described hereinabove, the cable side slit narrower in width than the conductor of the cable formed in the socket of the connector depresses, grasps the conductor of the cable to be thrust in it so as to firmly connect the socket with the cable of the conductor electrically and mechanically.

Also, in the above described connector, the connector side slit of the socket is formed, disposed so that the connector side slit of the socket may not be positioned on the extension line stretched in the slitting direction thereof from the cable side slit. The mechanical strength of the socket is larger and the portion grasped by the cable side slit of the plate shaped member composing the socket and the connector side slit becomes narrower in width so as to lighten the reduction in the mechanical strength of that portion. If the socket is made smaller in size, the socket does not reduce the force of retaining the conductor of the cable and the contact of the other connector so as to provide the positive connection among the socket and the cable conductor and the contact of the other connector.

In order to achieve the above described ob-

jects, the coaxial connector of the present invention with a central conductor being fixed through the insulator and the insulating plate to the outer conductor, is characterized in that the above described insulating plate to be put on the root portion of the above described central conductor is formed by a hoop shaped molding processing, and also, the outer peripheral face thereof is formed in a taper shape of upwards being spread, opened, a groove into which the above described central conductor is inserted is formed in the central portion thereof, the shape of the groove is formed into a taper shape reverse to the above described taper, and also, the length of the above described groove is set as the gap is formed between the tip end face portion of the above described groove and the above described central conductor.

According to the above described construction, in the coaxial connector with the central conductor being secured through the insulator and the insulating plate to the outer conductor, the insulating plate to be put on the root portion of the connector central conductor is formed by the hoop shaped molding treating so that the pitch adjusting may be easily effected even in the multiple string assembly in the putting of the above described insulating plate on the above described central conductor, the outer peripheral face of the above described insulating plate is formed in a taper shape of upwards effecting the spreading, opening operations, thus simplifying the operation of inserting the above described insulating plate into the above described outer conductor. Also, a groove into which the above described connector central conductor is inserted is formed in the central portion of the above described insulating plate, the groove shape thereof is formed in a taper shape reverse to the above described taper so that the extent in the pressure insertion of the cable central conductor into the slit of the above described connection central conductor is restrained, further the length of the groove is set so that a gap may be formed between the tip end face portion of the groove of the above described insulating plate and the above described connector central conductor so that the excessive cable central conductor is accommodated within the groove.

Further, in order to achieve the above described object, in the connecting construction between the coaxial connector and the coaxial cable in the present invention, a slit which is narrower in width than the diameter of the cable central conductor to be connected is formed in the tip end portion of the connector central conductor to be formed into a cylindrical shape, and also, the auxiliary soldering is effected on the above described cable central conductor.

According to the above described construction,

as the slit which is narrower in width than the diameter of the cable central conductor to be connected is formed in the tip end of the portion of the connector central conductor to be formed into the cylindrical shape, the above described cable central conductor is inserted under pressure into the slit so as to effect the connection between them. Accordingly, the soldering operation in the fine portions becomes unnecessary, thus allowing the mechanization and the reduction in the operation time, the cost down and the quality stabilization. As the auxiliary soldering operation is applied upon the above described cable central conductor, the cable central conductor is prevented from being oxidized, the contact resistance increase is prevented, thus making it possible to effect the electrical stabilization.

#### BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and features of the present invention will become apparent from the following description taken in conjunction with the preferred embodiment thereof with reference to the accompanying drawings, in which;

Fig. 1 is a perspective view showing a housing of a connector in accordance with a first embodiment of the present invention;

Fig. 2 and Fig. 3 are partial sectional views for illustrating the embodiment of the present invention;

Fig. 4a and Fig. 4b are respectively sectional views taken along a line of IV - IV of Fig. 3;

Fig. 5a and Fig. 5b are respectively sectional views taken along a line V - V of Fig. 3;

Fig. 6 is a partial sectional view showing another embodiment of the present invention;

Fig. 7 is a perspective view showing a socket of the connector in a second embodiment of the invention;

Fig. 8 is an expansion view of a socket of Fig. 7;

Fig. 9 is a partial sectional view showing the embodiment of the invention;

Fig. 10a and Fig. 10b are a plan sectional view and a front face view showing a condition before a conductor of a cable is thrust in into the slit of the socket;

Fig. 11a and Fig. 11b are a plan sectional view and a front face view showing a condition after the conductor has been thrust in;

Fig. 12 is a perspective view showing a socket of a connector showing a modified embodiment of the second embodiment of the invention;

Fig. 13 is an expansion view of a socket of Fig. 12;

Fig. 14 is a sectional view showing a connector having a socket of Fig. 6;

Fig. 15a and Fig. 15b are views showing application embodiment of the invention;

Fig. 16 (a) is a partial sectional view showing an embodiment of the coaxial connector in accordance with a third embodiment of the present invention;

Fig. 16 (B) is a sectional view taken along a line A - A in Fig. 16 (a);

Fig. 17 (a) is a sectional view for illustrating a gap portion to be formed by the tip end face portion of a groove of an insulating plate and a connector central conductor in the embodiment of the present invention;

Fig. 17 (b) is a sectional view taken along a line B - B in Fig. 17 (a);

Fig. 18 (a) is a perspective view showing the embodiment of the insulating plate in accordance with the present invention;

Fig. 18 (b) is a bottom face view showing the insulating plate;

Fig. 18 (c) is a sectional view taken along a line C - C in the Fig. 18 (b);

Fig. 19 (a) is a plan view showing one embodiment of the insulating plate molded, treated into a hoop shape;

Fig. 19 (b) is a partial enlarged view of the insulating plate in Fig. 19 (a);

Fig. 20 (a) is a plan view showing another embodiment of the insulating plate molded, treated into a hoop shape;

Fig. 20 (b) is a partial enlarged view of the insulating plate in Fig. 20 (a);

Fig. 21 is a perspective view showing the essential portions of a central conductor of a coaxial connector in accordance with a fourth embodiment of the invention;

Fig. 22 is a partial sectional view showing the embodiment of the connecting construction in accordance with the present invention;

Fig. 23 is a perspective view showing the essential portions of the embodiment of the connecting construction in accordance with the present invention;

Fig. 24 (a) is a plan sectional view showing a condition before a cable central conductor is inserted under pressure into the slit of the connector central conductor;

Fig. 24 is a front face view showing a condition before the cable central conductor is inserted under pressure into the slit of the connector central conductor;

Fig. 25 (a) is a plan sectional view showing a condition after the cable central conductor has been inserted under pressure into the slit of the connector central conductor;

Fig. 25 (b) is a front face view showing a condition after the cable central conductor has been inserted under pressure into the slit of the con-

connector central conductor; and  
 Fig. 26 and Fig. 27 are partial sectional views showing the conventional connector.

#### DETAILED DESCRIPTION OF THE INVENTION

Before the description of the present invention proceeds, it is to be noted that like parts are designated by like reference numerals throughout the accompanying drawings.

##### (Embodiments)

Referring now to the drawings, there is shown in Fig. 1 through Fig. 6 according to the embodiment of the present invention.

##### First Embodiment:

Fig. 1 shows a perspective view of a connector in a first embodiment of the present invention. Fig. 2 and Fig. 3 show steps in the mounting operation of the connector on the cable. The housing 1 of the connector is provided integrally with a connector outer conductor 5 to be electrically connected through the outer conductor adapter 4 of the connector with the housing conductor 3 of the coaxial cable 2, and a sleeve portion 20, and is integrally molded through the press treating of a plate shaped member composed of a good conductor. The sleeve portion 20 is provided with a first calking ring member 6 which causes the housing conductor 3 of the coaxial cable to fixedly adhere under pressure against the above described outer conductor adapter 4, and a second calking ring member 8 which retains the housing insulator 7 of the coaxial cable 2 to strengthen the combination with the coaxial cable 2. An inner contact 10 which is connected with the internal conductor 11 of the coaxial cable 2 is disposed through the insertion into the connector outer conductor 5, the inner contact 10 is insulated from the connector outer conductor 5 by the insulating bushing 9. The outer conductor adapter 4 which connects the connector outer conductor 5 with the housing conductor 3 of the coaxial cable 2 molds integrally with the connector outer conductor 5 in the embodiment to simplify the manufacturing step of the connector, a desired shape of adapter is manufactured in particular when necessary so as to make it possible to mount it on the connector outer conductor 5.

A step in the mounting of the connector having the above described construction on the coaxial cable 2 will be described hereinafter in accordance with the Fig. 2 through Fig. 5b. First, the internal

conductor 11 of the coaxial cable 2 and the internal insulator 12 to insulate the internal conductor 11 from the housing conductor 3 are inserted into the cylindrical outer conductor adapter 4. At this time, the outer conductor adapter 4 is inserted between the internal insulator 12 of the coaxial cable 2 and the housing conductor 3. Then, the internal conductor 11 is connected with the inner contact 10. In this embodiment, the inner contact 10 is cylindrical, is provided in its tip end portion with a slit 10a into which the internal conductor 10 is inserted, the internal conductor 10 is thrust, grasped into the slit 10a so as to connect both of them. Then, after the sleeve portion 20 continuing from the connector outer conductor 5 has been bent at an angle of approximately 90 degrees near the boundary portion 5a to the connector outer conductor 5, the housing conductor 3 is wound, calked with the first calking ring member 6 so as to cause the housing conductor 3 to adhere under pressure against the outer conductor adapter 4. At the same time, the second calking ring member 8 is wound on the housing insulator 7 to calk it to positively combine the connector with the coaxial cable 2. Fig. 4a is a sectional view showing a condition before the first calking ring member 6 is calked or Fig. 4b is a sectional view after it has been calked. Fig. 5a is a sectional view showing a condition before the second calking ring member 8 is calked, or Fig. 5b is a sectional view showing a condition after it has been calked.

As described in Fig. 6, the sleeve portion 20 is formed of one calking ring member 13, is calked integrally for each housing insulator 7, so that it is possible to achieve the combination between the coaxial cable 2 and the connector at the same time when the housing conductor 3 is caused to adhere under pressure on the outer conductor adapter 4.

In the above described embodiment, although a L-shaped coaxial connector is shown, the connector of the present invention is not restricted to it, but may be applied to the connectors of various types, and even to the connector of multiple core cable.

As described hereinabove, since the connector of the first embodiment has the connector outer conductor formed integrally with the sleeve portion, the manufacturing cost may be reduced by the simplification of the manufacturing steps. Also, in the conventional connector, a step of keeping the sleeve for pressure adhering use, which was indispensable, extended through the cable in advance becomes unnecessary, with an effect that the time required for the cable assembly may be reduced.

The connector which causes the housing conductor to adhere under pressure against, connect with the outer conductor adapter with the first cal-

king ring member, retains the housing insulator of the cable with the second calking ring member so as to strengthen the combination with the cable may be made more positive, higher in reliability in the electrical and mechanical connection between the cable and the connector.

#### Second Embodiment:

A second embodiment of the present invention will be described hereinafter with reference to Fig. 7 through Fig. 15. Fig. 7 is a perspective view showing a socket portion of a connector in accordance with the present invention. Fig. 8 is a view showing a condition a plate shaped member composing a socket has been expanded. As shown, the socket 21 in the embodiment is composed of a plate shaped member 22 composed of a good conductor which is press-treated into the given shape being wound into a cylindrical shape. Namely, a cable side slit which is narrower in width than the diameter of the central conductor 36 into which the central conductor 36 (Fig. 3, so on) of the cable is thrust in is formed on the upper side (is treated into a cylindrical shape, becomes a side to be connected with the cable) of the plate shaped member 2 of Fig. 8. Furthermore, a connector side slit 24 is formed on the lower piece (is treated into a cylindrical shape, becomes a side to be connected with the contact of the other connector) so that the contact may be retained firmly by the elastic force of the plate shaped member 22 by the engagement with the contact (not shown) of the other connector. Further, the cable side notches 25, 25 and the connector side notches 26, 26 are formed on both the right, left sides of the plate shaped member 22, treated into the cylindrical shape, thereafter another cable side slit 23a and a connector side slit 24a are respectively composed. A step of connecting with the conductor of the cable the connector having the above described socket 21 will be described. As described in Fig. 9, the socket 21 insulated from the connector outer conductor 28 is inserted by the insulating bushing 29 into the connector outer conductor 28 of the housing 27. An outer conductor adapter 31 connecting the connector outer conductor 28 with the housing conductor 34 of the cable 32 is mounted on the connector outer conductor 28. The central conductor 36 of the coaxial cable 32 exposed from the housing insulator 33, and the internal insulator 35 are inserted into the outer conductor adapter 31, and also, the housing conductor 34 adheres under pressure on the outer periphery of the outer conductor adapter 31 with the sleeve 30. Then, a depressing jig 38 is inserted from the opening portion 37 of the housing 27, and the central con-

ductor 38 is thrust into the cable side slits 23, 23a of the socket 21, and thereafter, the depressing jig 38 is withdrawn to put the cover (not shown) on the opening portion 37. The central conductor 38 is inserted under pressure into the slits 23, 23a of the socket 21 in this manner so as to connect the socket 21 with the central conductor 38 electrically and mechanically. The condition before the central conductor 38 is thrust in into the slits 23, 23a of the socket 21 is shown in Fig. 10a and Fig. 10b, while the condition after it has been thrust in is shown in Fig. 11a and Fig. 11b. The connector having the above described construction makes it possible to effect the quick, positive connection, without being involved in the soldering step, in the cable assembly step. The stable connection may be maintained as the solder is not melted even at the high temperatures.

Although a connector for single core coaxial cable use is shown in the above described embodiment, the connector in the present invention is not restricted to the connection of the single core cable as described hereinabove, and may be applied even to the connection of the multiple core cable and the multiple core connector.

A modified embodiment of the connector in the second embodiment will be described hereinafter. Fig. 12 is a perspective view showing the socket portion of the connector in the modified embodiment of the present invention. Fig. 13 is a view showing a condition where a plate shaped member composing the socket has been expanded. Fig. 14 shows a connector provided with a socket of Fig. 12. As shown in the drawing, the socket 21 in the embodiment is provided at its approximate center of the upper side of the plate shaped member 22 (is treated in a cylindrical shape, becomes a side to be connected with the cable) with a cable side slit 23 into which the central conductor of the cable is thrust in, with the width of the slit 23 being narrower in construction than the diameter of the central conductor 26. Further, two connector side slits 24, 24 are formed on the lower side (is treated into a cylindrical shape, becomes a side to be connected with the contact of the other connector) so that the contact may be firmly retained by the elastic force of the plate shaped member 22 through the engagement with the contact of the other connector. The connector side slits 24, 24 are formed in the positions of the right, left objects of the extension line A, avoiding the extension line A so that they may not be positioned on the extension line A in the slitting direction of the cable side slit 23. The cable side notches 25, 25 and the connector side notches 26, 26 are formed on both the right, left sides of the plate shaped member 22, are treated into the cylindrical shape. Thereafter, another cable side slit 23a and the connection side

slit 24a are composed respectively. In the embodiment, after the socket 21 has been treated into the cylindrical shape, the connector side slits 24, 24a are arranged at equal intervals of approximately 120 degrees, thus making it possible to have the stable engagement with the contact (not shown) of the connector which becomes the other one. The number of the cable side and connector side slits is not restricted by the above described embodiment, and the slit of an optional number may be provided when necessary. The slit on the connector side may be desired to be in the range of 1 through 5 when the mechanical strength and so on of the socket 21 is taken into consideration.

Fig. 14 shows the coaxial connector engaged with the socket 1 having the above described construction 1, the construction of the other portion is similar to the embodiment of the first connector shown in Fig. 9. In the embodiment of the Fig. 14, the connector side 21A of the socket 21 is engaged with the male contact (not shown) of the other connector so as to firmly retain it. The cable side slits 23, 23a of the socket 21 grasp the central conductor 36 of the cable so as to realize the firm electrical, mechanical connection between both of them.

The socket 21 having the above described construction is larger in its mechanical strength of the socket 21, because the cable side slit 23 and the connector side slits 24, 24a are not positioned on the same line. Furthermore, as the distance between both of them, namely, the distance of the cable side slit 23 and the intermediate portion between the connector side slits 24, 24a become shorter, the socket is not required to be made longer with an object of making the above described intermediate portion longer so as to retain the mechanical strength of the socket 21. Also, if the full length of the socket 21 is made shorter, for example, in order to make the connector smaller in shape, the mechanical strength of the socket 21 is not necessary to be reduced so much. The better electrical, mechanical strength with respect to the central conductor 36 of the cable and the contact of the other connector may be retained.

Although the connector for single core coaxial cable use is shown in the above described embodiment, the connector of the modified embodiment of the present invention is not restricted to the connection of the single core cable as described hereinabove, and may be applied even to the connection of the multiple core cable and the multiple core connector.

Also, as shown in Fig. 15a and Fig. 15b, even by the forming of the cable side slit 23 in the approximately vertical direction with respect to the axial center of the socket 21, the similar effect to the above described embodiment may be obtained.

Since the connector of the second embodiment is so constructed that the slit narrower in width than the conductor of the cable is provided in the end portion of the cylindrical socket, the conductor of the cable is thrust into the slit to cause the conductor to come into pressure contact against the socket so as to have the electrical, mechanical connection between both of them, so that the soldering operation becomes unnecessary, the time of the cable assembling operation may be shortened, the disconnection by the melting of the soldering is not caused even if it is used at high temperatures, thus realizing the stable connection.

Since the connector in the modified embodiment of the second embodiment has the slit formed in a position avoiding it so that the slit on the connector side may not be positioned on the line extended in the slitting direction from the slit on the cable side, the mechanical strength is not reduced even if the socket is made smaller, with an effect that the sufficient mechanical, electrical connection with the conductor of the cable and the contact of the other connector may be retained, thus making it possible to make the connector smaller in size.

### Third Embodiment:

A third embodiment of the coaxial connector in accordance with the present invention will be described hereinafter with reference to the drawings.

It is to be noted that like parts which have the same functions as in the conventional embodiment are designated by like reference numerals.

As shown in Fig. 16 (a), the connector central conductor 42 insulated from the connector outer conductor 41 by the insulator 43 secured into the interior of the connector outer conductor 41 is arranged within the connector outer conductor 41 of the housing 40. The connector central conductor 42 is composed of a member which has been treated, molded into the cylindrical shape, a slit 46 for cable use, into which the cable central conductor 52 is inserted under pressure, is formed in two locations to be connected with straight lines, with the slit 46 being smaller in diameter than the cable central conductor 52.

Also, the insulating plate 44 is put on the root portion of the connector central conductor 42, the connector central conductor 42 is retained in complete insulation with the connector outer conductor 41.

An adapter 52 to be connected with the cable outer conductor 51 is mounted on the connector outer conductor 41. The cable central conductor 52 and the cable internal insulator 53 are inserted into the adapter 52, the cable central conductor 52 is

inserted under pressure into the slit 46 of the connector central conductor 42 so as to connect the connector central conductor 42 with the cable central conductor 52 electrically and mechanically.

The insulating plate 44 put on the root portion of the connector central conductor 42 is formed by the hoop shaped molding treating (Fig. 19 and Fig. 20). When it is put on the connector central conductor 42, the directionality of the groove 44a becomes apparent if the groove 44a face is provided downwards. The easier pitching adjustment is provided especially when the multiple string assembling operation is effected.

Also, as shown in Fig. 18, the insulating plate 44 is formed in an upward (in a condition of Fig. 16) spreading, opening taper shape. Accordingly, since the outer diameter of the insulating plate 44 is smaller in its lower portion than the inner diameter of the connector outer conductor 41, the insulating plate 44 is easily inserted into the connector outer conductor 41, and may be put on the connector central conductor 42.

The groove 44a into which the connector central conductor 42 is inserted is formed to the outer peripheral face 44b from near the central portion on the single face of the insulating plate 44, the shape of the groove 44a is formed into a taper shape reverse to the above described taper of the outer peripheral face 44b. Accordingly, as shown in Fig. 16 (b), when the insulating plate 44 is put on the root portion of the connector central conductor 42, the connector central conductor 42 is strictly engaged into the groove 44a of the insulating plate 44, so that the insulating plate 44 is not disengaged from the connector central conductor 42 by the vibrations during the operation, also, the slit 46 formed in the connector central conductor 42 is prevented from being spread by the pressure insertion of the cable central conductor 52, so that the connection of the cable central conductor 52 into the slit 46 comes to be positively effected.

As shown in Fig. 17 (b), the length of the groove 44a is set (Fig. 17 (b)) so that the gap 45 may be formed between the tip end face portion of the groove 44a formed in the insulating plate 44 and the connector central conductor 42, also, the thickness of the insulating plate 44 and the depth of the groove 44a are set so that the air gap which may be caused between the connector outer conductor 41 and the connector central conductor 42 may be removed. Therefore, when the insulating plate 44 has been put on the connector central conductor 42, the insulating plate 44 comes to sufficiently cover the root portion of the connector central conductor 42, the excessive cable central conductor 52 which has been protruded from the connector central conductor 42 is accommodated within the gap 45, thus preventing the short-cir-

cuiting between the cable central conductor 52 and the connector external conductor 41, and resulting in improved withstand voltage.

In the coaxial connector of the third embodiment as described hereinabove, the insulating plate to be put on the root portion of the connector central conductor is formed by the hoop shaped molding treating, the outer peripheral face thereof is taper-shaped to be upwards spread, opened, the groove to which the above described connector central conductor is inserted is formed in the central portion, the shape of the groove is formed in a taper shape reverse to the above described taper. Also, since the length of the above described groove is set so that the gap may be formed between the tip end face portion of the above described groove and the above described connector central conductor, the directionality of the groove becomes apparent even if the groove face is provided downwards when the above described insulating plate is put on the above described connector central conductor, especially when the multiple string assembling operation is effected in the hoop shape, the pitch adjusting operation becomes easy to effect. Also, since the outer diameter of the insulating plate lower portion is smaller than the inner diameter of the connector outer conductor, the above described insulating plate may be inserted into the above described connector outer conductor, and the above described groove is downwards spread, opened, so that the above described insulator may be easily put on the above described connector central conductor, thus improving the operability. Furthermore, the above described connector central conductor is strictly engaged into the groove of the above described insulating plate so as to prevent the above described insulating plate from being disengaged from the above described connector central conductor with the vibrations and so on during the operation, also, to prevent the slit formed in the above described connector central conductor from being spread by the pressure insertion of the above described cable central conductor, so that the connection between the above described connector central conductor and the cable central conductor may be made positive. Further, as the excessive cable central conductor is accommodated by the above described groove of the above described insulating plate, the short-circuiting may be prevented, thus improving the withstand voltage.

#### Fourth Embodiment:

A fourth embodiment of the coaxial connector in the present utility model will be described hereinafter with reference to the drawings.

As described in Fig. 21, the connector central conductor 61 is composed of a member treated, formed into a cylindrical shape, a slit 64 for cable use, into which the cable central conductor 71 is inserted under pressure, is formed in two locations to be connected with the straight line, with the slit 64 being smaller in diameter than the cable central conductor 71.

The coaxial connector having the above described connector central conductor 61 will be described hereinafter with reference to Fig. 22. The cylindrical connector central conductor 61 shown in Fig. 21 which is insulated from the connector outer conductor 62 by the connector internal insulator 63 is disposed within the connector outer conductor 62 of the housing 60. The outer conductor adapter 65 to be connected with the outer conductor 72 of the cable is mounted on the connector outer conductor 62. And the cable central conductor 71 and the cable internal insulator 73 are inserted into the outer conductor adapter 65, the cable central conductor 71 is inserted into the slit 64 of the connector central conductor 61. The depressing jig 80 is inserted from the opening portion of the housing 60, the cable central conductor 71 is inserted under pressure (in an arrow direction of Fig. 22) into the slit 64 of the connector central conductor 61 to effect the inserting operation. The connector central conductor 61 is strictly connected with the cable central conductor 71 electrically and mechanically (Fig. 23). On the other hand, the auxiliary soldering 71a is applied on the surface of the cable central conductor 71 to be inserted under pressure into the connector central conductor 61. The auxiliary welding method is not restricted in particular in addition to the plating.

A condition before the cable central conductor 71 auxilliarily soldered is inserted under pressure into the slit 64 of the connector central conductor 61 is shown in Fig. 24 (a) and (b), a condition after the central conductor 71 has been inserted under pressure is shown in Fig. 25 (a) and (b).

In the connecting construction having such above described construction as described hereinabove, the soldering step of fine portions referred to as the soldering between the connector central conductor 61 and the cable central conductor 71 is not accompanied. Therefore, the easier mechanization may be effected, the operation time may be shortened, and the artificial operation is not accompanied, thus resulting in the stability of the quality. Since the solder is not melted due to the connection between the connector central conductor 61 and the cable central conductor 71 even at the high temperatures, the stable connection may be retained. Also, as described in the case of the above described embodiment, when the cable central conductor 71 is brought into pressure contact

at two locations of the connector central conductor 61, the mounting strength is increased more than the pressure contact at one location, the electrical connection becomes stable. Further, as the auxiliary soldering 71a is applied upon the cable central conductor 71, the increase and so on in the contact resistance by the oxidation of the cable central conductor 71 may be prevented, the reliability with respect to the quality may be improved.

Although the present invention has been fully described by way of example with reference to the accompanying drawings, it is to be noted here that various changes and modifications will be apparent to those skilled in the art. Therefore, unless otherwise such changes and modification depart from the scope of the present invention, they should be construed as included therein.

## Claims

(1) A connector comprising a housing which is provided integrally with a connector outer conductor to be connected through an outer conductor adapter with at least a housing conductor of a cable, and a sleeve portion that causes the housing conductor of the cable to adhere under pressure on the outer conductor adapter, and also combines the cable with the connector, and an inner contact that is provided, insulated from the connector outer conductor, on the inner side of the above outer conductor, and is connected with the internal conductor of the cable.

(2) The connector as defined in claim 1, further comprising a first calking ring member which causes the housing conductor of the cable to fixedly adhere under pressure on the outer conductor adapter, and a second calking member which retains the housing insulator of the cable to intensify the combination of the cable.

(3) A connector characterized in that at least one cable side slit which is narrower in width than the conductor of a cable to be thrust in it is provided on the side of a cylindrical socket, to be connected to the conductor of the cable, and the conductor is thrust in into the slit on the cable side to bring the socket and the conductor into pressure contact with each other to effect the electrical, mechanical connection between both of them.

(4) A connector characterized in that at least one cable side slit which is narrower in width than the conductor of a cable to be thrust in it is provided on the side of a cylindrical socket, to be connected to the conductor of the cable, and at least one connector side slit is provided so that it may not be provided on an extension line extended in a slitting direction thereof from the above described cable side slit, on the side of connecting with the contact

of the other connector.

(5) A coaxial connector with a central conductor being fixed through an insulator and an insulator plate to the outer conductor, characterized in that the insulating plate to be put on the root portion of the central conductor is formed by a hoop shaped molding treating, and also, the outer peripheral face thereof is formed in a taper shape of upwards being spread, opened, a groove into which the central conductor is inserted is formed in the central portion thereof, the shape of the groove is formed into a taper shape reverse to the taper, and also, the length of the groove is set as the gap is formed between the tip end face portion of the groove and the central conductor.

(6) A connecting construction between a coaxial connector and a coaxial cable characterized in that a slit which is narrower in width than the diameter of the cable central conductor to be connected is formed in the tip end portion of the connector central conductor to be formed into a cylindrical shape, and the auxiliary soldering is effected on the cable central conductor.

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Fig. 1

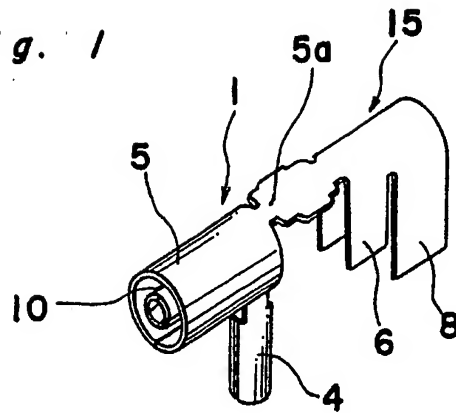


Fig. 2

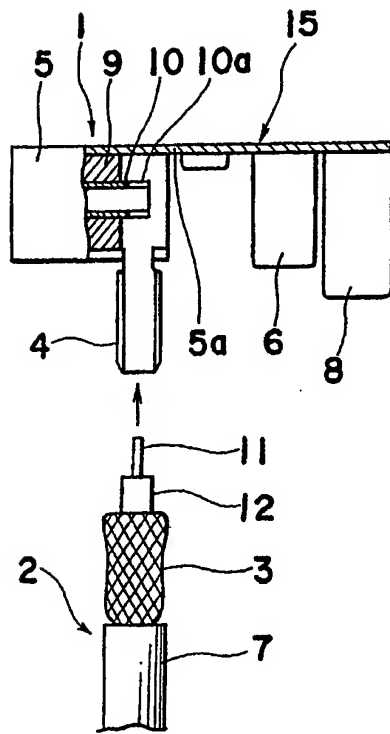
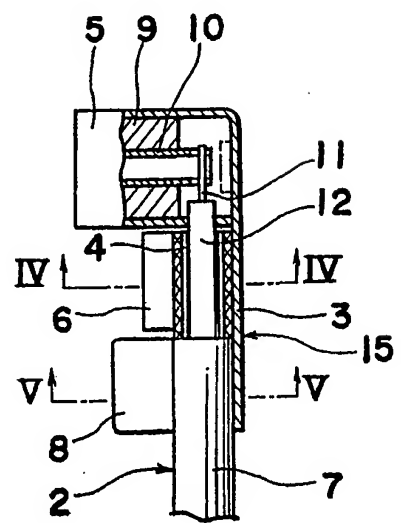
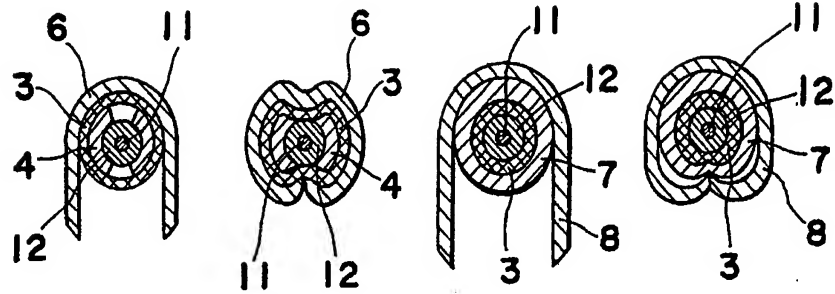


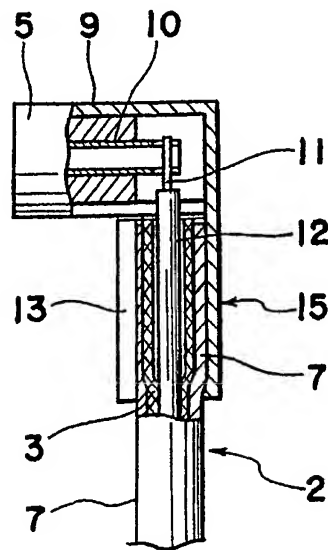
Fig. 3



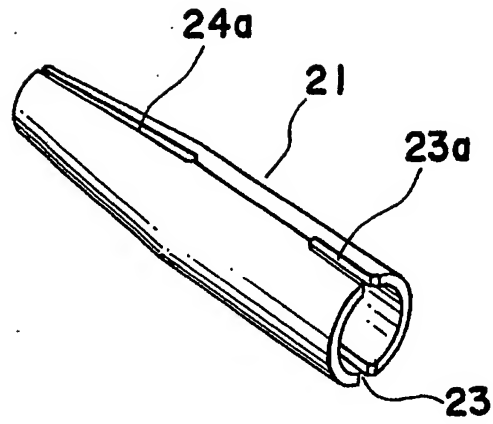
*Fig. 4a    Fig. 4b    Fig. 5a    Fig. 5b*



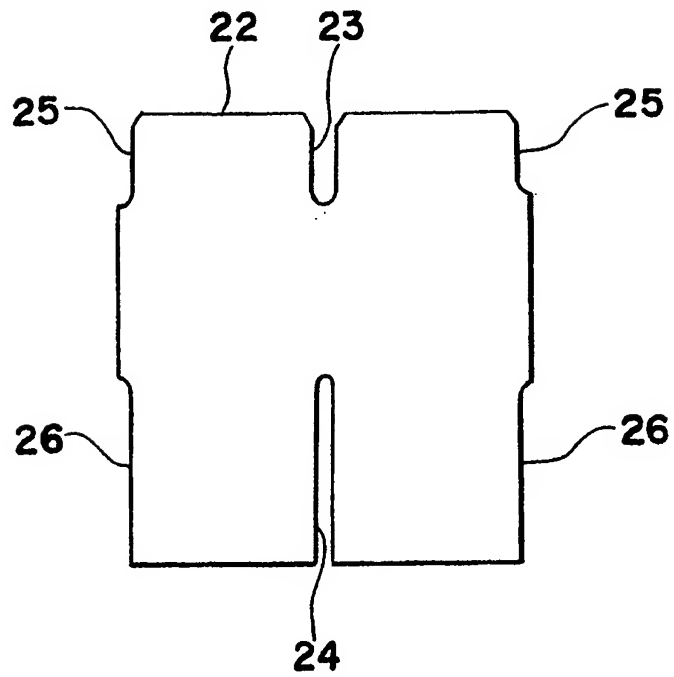
*Fig. 6*



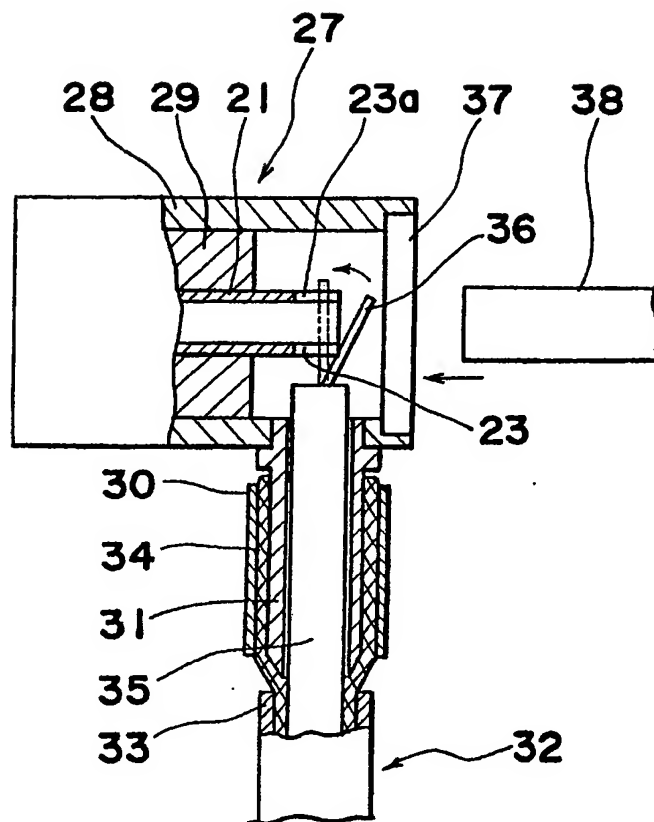
*Fig. 7*



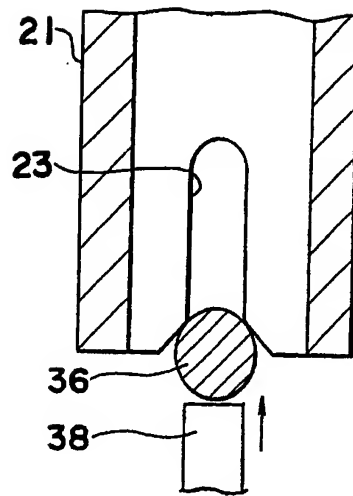
*Fig. 8*



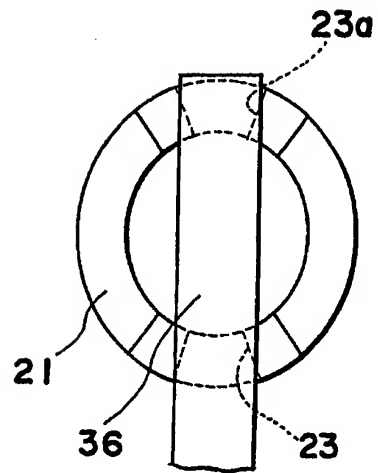
*Fig. 9*



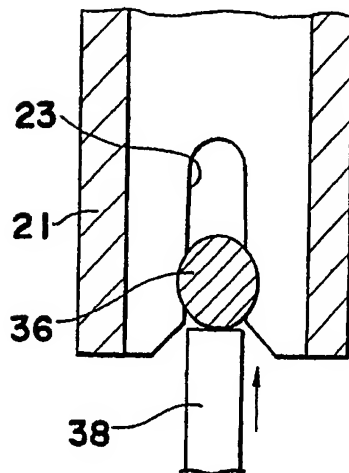
*Fig. 10(a)*



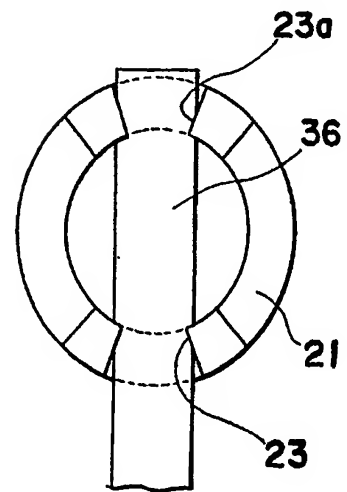
*Fig. 10(b)*



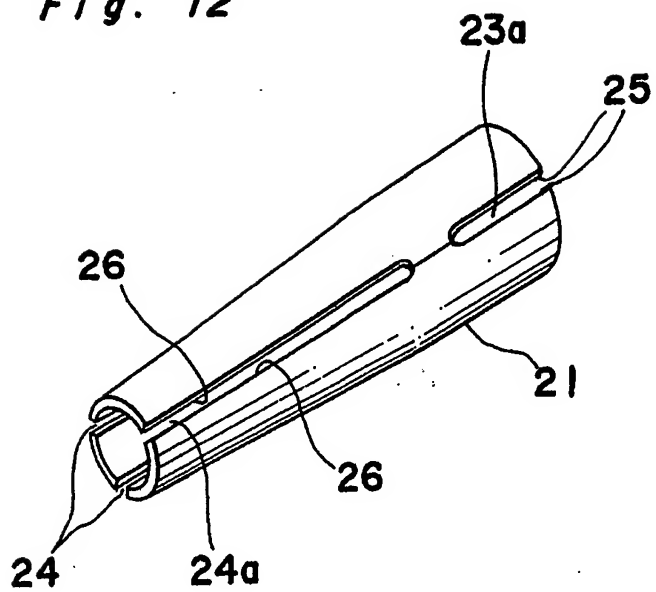
*Fig. 11(a)*



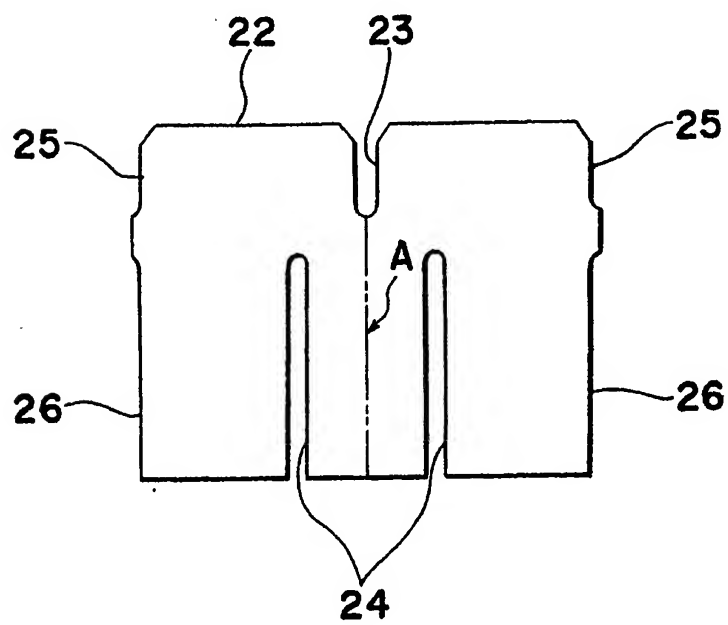
*Fig. 11(b)*



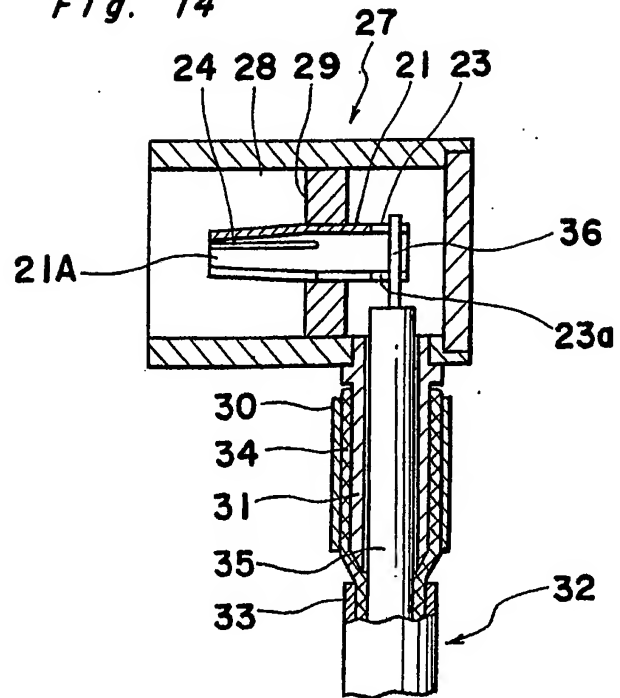
*Fig. 12*



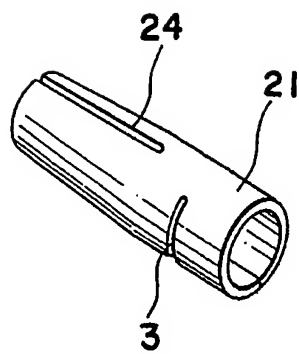
*Fig. 13*



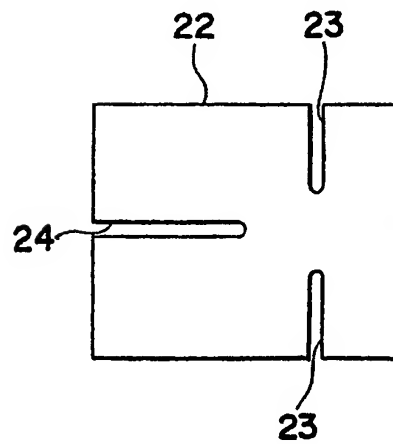
*Fig. 14*



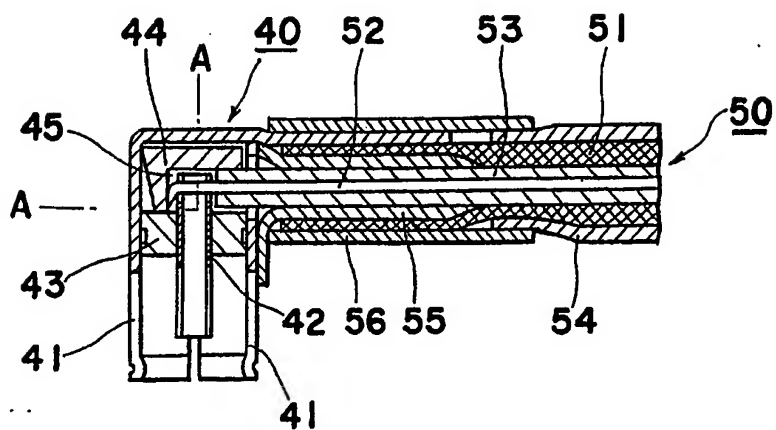
*Fig. 15a*



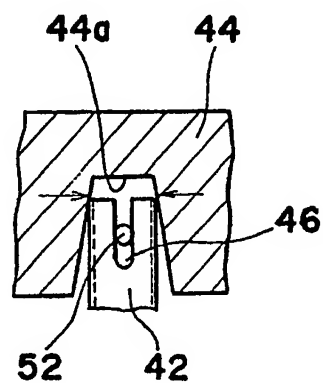
*Fig. 15b*



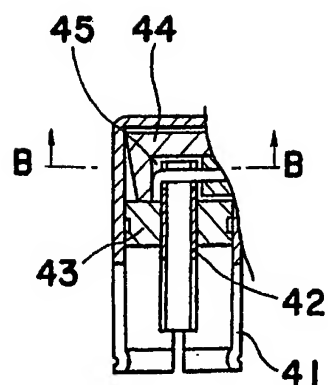
*Fig. 16(a)*



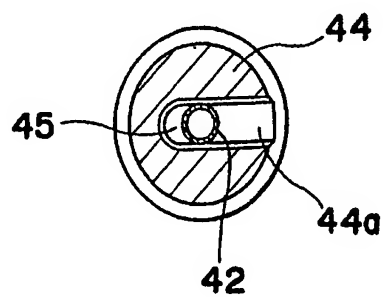
*Fig. 16(b)*



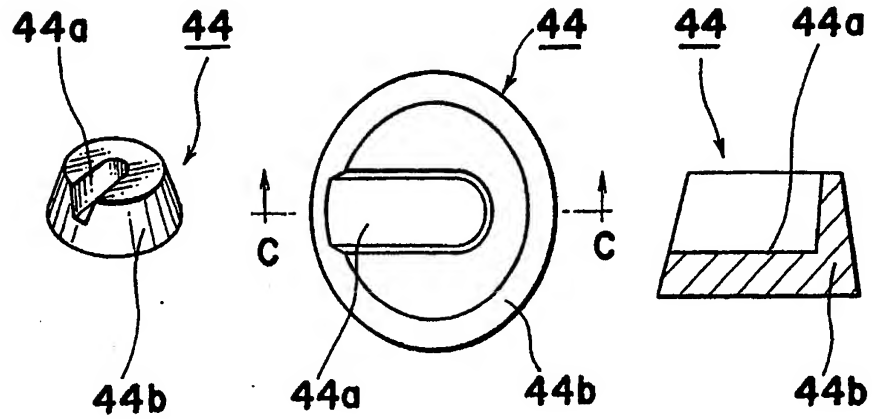
*Fig. 17(a)*



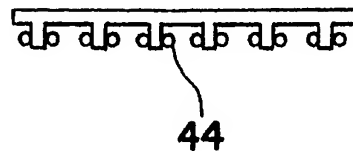
*Fig. 17(b)*



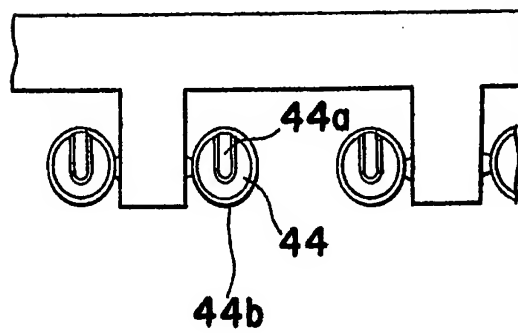
*Fig. 18(a)*      *Fig. 18(b)*      *Fig. 18(c)*



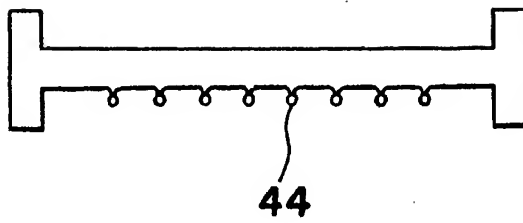
*Fig. 19(a)*



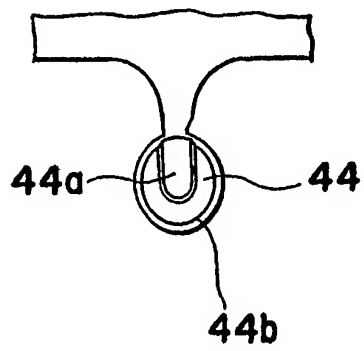
*Fig. 19(b)*



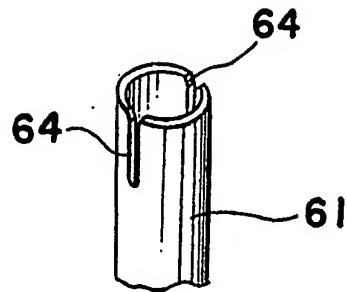
*Fig. 20(a)*



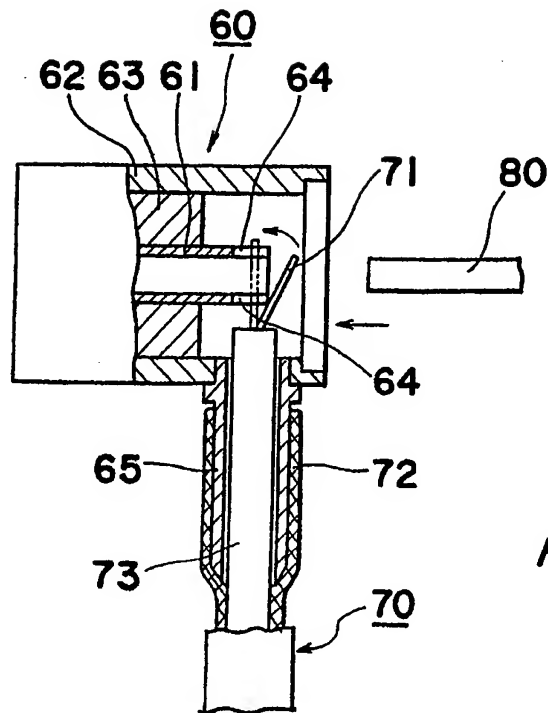
*Fig. 20(b)*



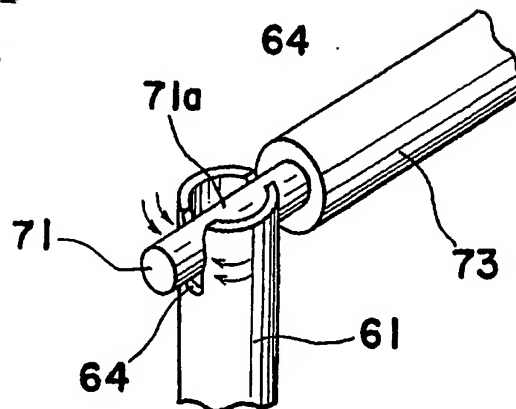
*Fig. 21*



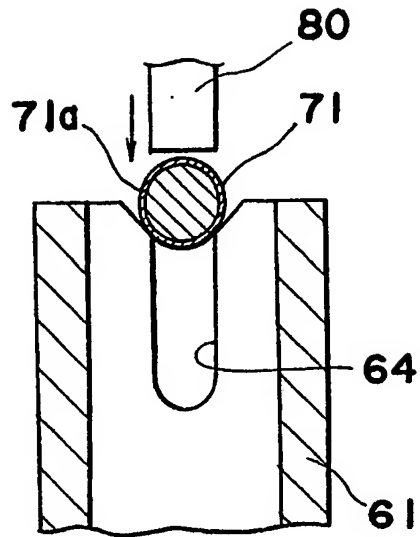
*Fig. 22*



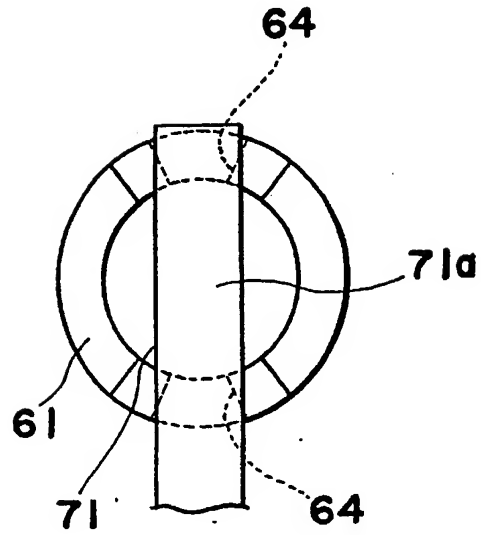
*Fig. 23*



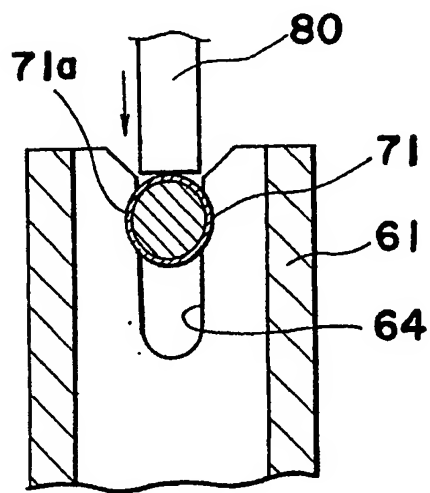
*Fig. 24(a)*



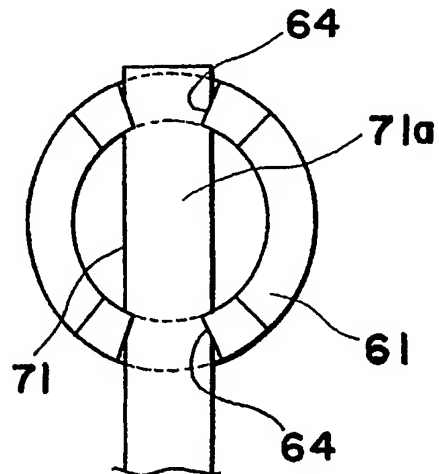
*Fig. 24(b)*



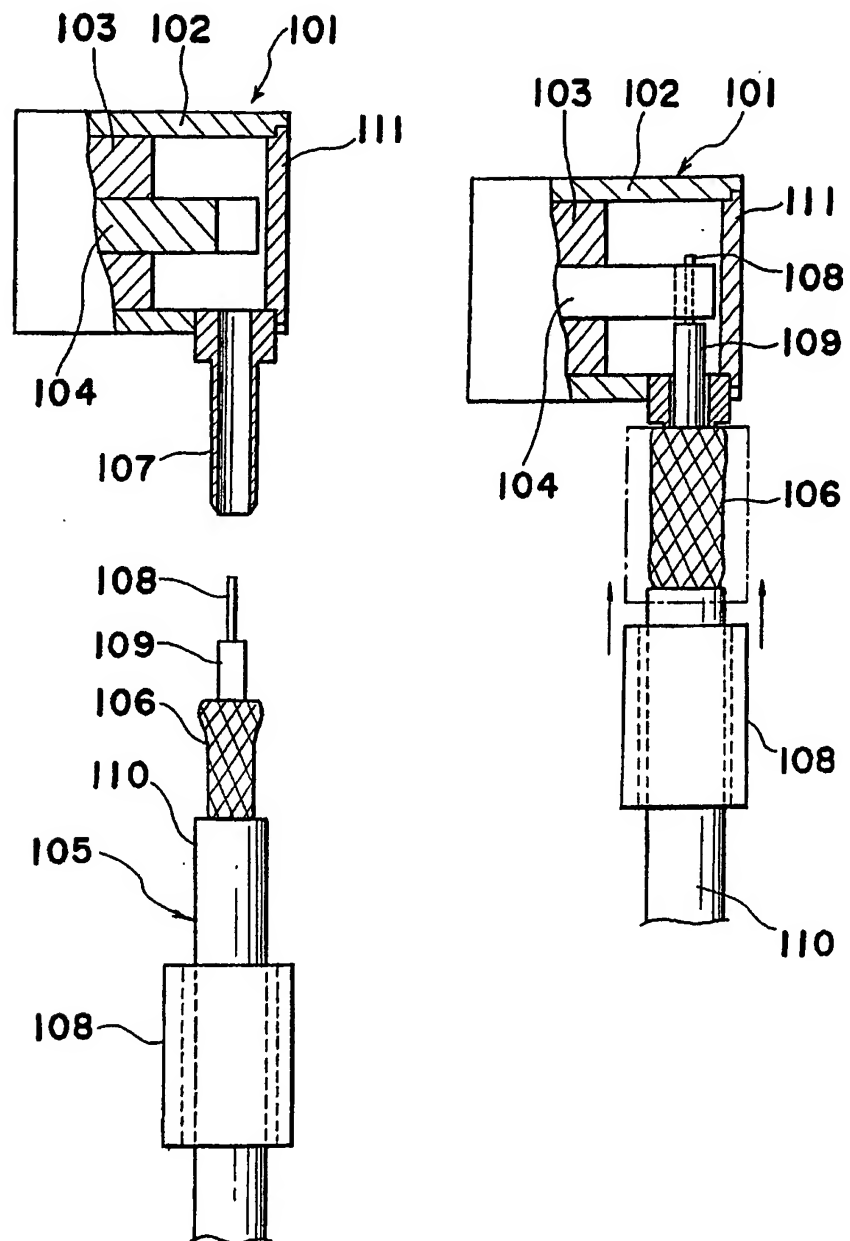
*Fig. 25(a)*



*Fig. 25(b)*



*Fig. 26 Prior Art      Fig. 27 Prior Art*





European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT			EP 90114704.1
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. CL.5)
A	<u>EP - A2/A3 - 0 311 740</u> (CALEARO) * Claim 1 * ---	1, 2, 5 6	H 01 R 17/12
A	<u>DD - A1 - 275 351</u> (VEB ANTENNENWERKE BAD BLANKENBERG) * Claims 1, 2 * ---	1-6	
A	<u>DE - B - 1 665 624</u> (SIEMENS AG) * Column 3, line 67 - column 6, line 7 * -----	1, 2	
			TECHNICAL FIELDS SEARCHED (Int. CL.5)
			H 01 R 17/00
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 14-11-1990	Examiner SCHMIDT
<b>CATEGORY OF CITED DOCUMENTS</b>			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- A : member of the same patent family, corresponding document	

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